

PATENT

Norman C. Witbeck

TOWED TRANSPORT, LAUNCH AND RECOVERY RAFT

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates a perspective view of an embodiment of a towed raft according to the present invention;

Figure 2 illustrates a top view of an embodiment of a towed raft according to the present invention;

Figure 3 illustrates a front view of an embodiment of a towed raft according to the present invention;

Figure 4 illustrates a side view of an embodiment of a towed raft according to the present invention; and

Figure 5 illustrates a perspective view of another embodiment of a towed raft according to the present invention.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

Embodiments of a towed raft 10 for transport, launch and recovery of a marine vessel 12 are shown in Figures 1-5. Referring to Figures 1 and 2, in one embodiment, the towed raft 10 comprises a generally U-shaped floating frame 14 having an open end 16, and a spine and rib assembly 18 connected thereto. A receiving area 20 is generally defined laterally by the floating frame 14, and upwardly by the spine and rib assembly 18. During use, the receiving area 20 is

also downwardly defined by the level of water (not shown) on which the towed raft 10 is located for use. The receiving area 20 is configured to receive a marine vessel, 12 therein, substantially through the open end 16 of the floating frame 14.

In one embodiment, the receiving area 20 has a longitudinal centerline 22 substantially aligned with the longitudinal axis of the towed raft 10. In other embodiments, the spine and rib assembly 18 comprises a spine 24 upwardly spaced from the floating frame 14 and substantially aligned with the longitudinal centerline 22. In yet other embodiments, the assembly 18 further comprises a plurality of ribs 26 that connect the spine 24 to the frame 14. In yet other embodiments, the ribs 26 extend generally outwardly and downwardly from the spine 24 to the floating frame 14. One or more lifting devices 28 may be secured to the towed raft 10. In one embodiment, each lifting device 28 is adapted to lift, lower and retain a marine vessel 12 relative to the receiving area 20. In other embodiments, the lifting devices 28 are able to retain a marine vessel 12 within the receiving area 20 having an underside clearance from the water level of between about 10 inches and about 30 inches.

As shown in Figure 2, the floating frame 14 in one embodiment comprises a pair of spaced-apart floats 30 connected by a cross brace 32 at a forward end 34 of the frame 14 that is opposite the open end 16. In other embodiments, the floats 30 are substantially parallel. In yet other embodiments, the longitudinal centerline 22 of the receiving area 20 is substantially equidistant between the floats 30.

Each float **30** may have construction as desired suitable for the purposes of the present invention. In one embodiment, each float **30** comprises a pontoon hull float. In other embodiments, each float **30** comprises a catamaran hull float. In yet other embodiments, each float **30** comprises a hull manufactured of aluminum or fiberglass material.

As shown in Figures 2-5, the floats **30** may be adapted as desired for use of the towed raft **10**. In one embodiment, one or both floats **30** comprise a substantially flat upper surface **36** adapted for occupancy by one or more crew members (not shown) manning the towed raft **10**. The flat upper surfaces **36** have an inside perimeter **38** adjacent to the receiving area **20** and an outside perimeter **40** generally on the outside of the towed raft **10**. In other embodiments, at least one generally upstanding railing **42** extends substantially along the inside perimeter **38** of each float **30** having a flat upper surface **36**. In yet other embodiments, at least one generally upstanding railing **42** extends along at least one portion of the outside perimeter **40**. In yet other embodiments, generally upstanding railings **42** are configured according to rules, regulations or other standards in the marine industry.

Referring now to Figures 1 and 2, the cross brace **32** at the forward end **34** of the frame **14** may have any configuration suitable for rigidly connecting the pair of floats **30** in the floating frame. In one embodiment, the cross brace **32** comprises a rigid flat or multi-faceted sheet **44** extending between the floats **30** and secured thereto at opposite ends **46** of the sheet. In other embodiments, the

sheet 44 has a length sufficient to space the floats 30 apart sufficiently to define the receiving area 20 sized as desired to receive a marine vessel 12. In yet other embodiments, a tow winch 48 is secured to the cross brace 32, the tow winch 48 being adapted to tow a marine vessel 12 into position for recovery of the vessel into the receiving area 20 prior to lifting by the lifting device 28.

Referring now to Figures 2-4, the spine and rib assembly 18 upwardly defines the receiving area 20. In one embodiment, the spine 24 comprises a generally longitudinal beam 50 spaced above the floating frame 14 and substantially aligned with the longitudinal centerline 22. In other embodiments, at least two pairs of ribs 26 connect the spine 24 to the floating frame 14. In yet other embodiments, the ribs 26 in each pair extend generally outwardly and downwardly from the spine 24 on laterally opposite sides 52 of the spine. In yet other embodiments, the pairs of ribs 26 comprise an arched connection of the spine 24 to the floating frame 14. In yet other embodiments, at least one lifting device 28 is provided corresponding to each pair of ribs 26.

A lifting device 28 can be any device suitable for releasably connecting to a marine vessel 12 and launching or recovering and retaining the vessel relative to the receiving area 20. In one embodiment, a lifting device 28 comprises a cable 54 having a hook or other connecting device 56 at a distal end 58 of the cable and a connected end 60 wound about a reel 62. In other embodiments, the reel 60 has operative controls 64 for winding and unwinding the cable 54 about the reel. In yet other embodiments, operative controls 64 comprise a manual winch or a

motorized winch. In yet other embodiments, operative controls 64 comprise at least one hydraulic lift cylinder. In yet other embodiments, each lifting device 28 is adapted to raise and lower loads of up to about 7,500 pounds.

A lifting device 28 may be secured to the spine 24 by any suitable means at any suitable position for the purposes of the present invention. In one embodiment, each lifting device 28 is secured to the underside 66 of the spine 24 in spaced relation to each other lifting device, if any. In other embodiments, each lifting device 28 is secured within the spine 24 and the cable 54 extends generally downwardly from the underside 66 of the spine. In yet other embodiments, rigid support elements 68 are secured to the spine 24 generally adjacent the location of each lifting device 28. The support elements 68 may be adapted to provide additional structural support to the spine 24 during launch, recovery, lifting and retention of a marine vessel 12 by the lifting devices 28.

The dimensions of a towed raft 10 according to the embodiments of the present invention are determined according to the towing limitations of a user of the raft and according to the size of the marine vessel 12 used in connection with the towed raft. In one embodiment, the towed raft 10 has a length of between about 25 feet and about 40 feet. In other embodiments, the length is about 33 ½ feet. In yet other embodiments, the towed raft 10 has a width of between about 8 feet and about 15 feet. In yet other embodiments, the width is about 12 ½ feet. In yet other embodiments, the towed raft 10 has a dry-dock height of between about

6 feet and about 15 feet. In yet other embodiments, the dry-dock height is about 8 $\frac{3}{4}$ feet.

The marine vessel **12** used in connection with the embodiments of the towed raft **10** may be any vessel having short-range uses for which transport to the location of such uses is desirable. In one embodiment, the marine vessel **12** comprises a swimmer delivery vehicle **70**. In other embodiments, the swimmer delivery vehicle **70** has a passenger capacity of between **2** and **10**.

As shown in Figures 1, 3 and 5, in one embodiment, the towed raft **10** has one or more tow-line connection points **72** located generally at the forward end **34** of the floating frame **14**. In other embodiments, tow-line connection points **72** are located on each float **30** adjacent opposite ends **46** of the cross brace **32**. In yet other embodiments, the tow-line connection points **72** are configured to receive distal connections **74** from a tow line **76** extending from a tow craft (not shown). In yet other embodiments, the towed raft **10** may be towed by the tow craft at a speed up to about 18 knots with a marine vessel **12** retained within the receiving area **20**.

For lifting devices **28** comprising non-manual operative controls, a power source (not shown) may be provided for powering the lifting device. In one embodiment, the power source comprises a battery-stored power source. In other embodiments, the battery-stored power source has a power storage capacity sufficient for at least two repetitions of a set of lowering and lifting a marine vessel **12** relative to the receiving area **20**.

As shown in Figure 4 in broken-line form, in some embodiments of a towed raft 10, it may be desirable to provide mechanical means 78 for propelling the raft 10 along a body of water (not shown). In one embodiment, mechanical means 78 for propelling the raft 10 comprise either a marine outboard motor, a water jet motor, or a diesel motor that is operatively connected to a propeller assembly. In other embodiments, steering means 80 for navigating the towed raft 10 with mechanical means 78 for propelling it are also provided. In yet other embodiments, the steering means 80 is mounted at the forward end 34 of the floating frame 14.

The receiving area, 20 defined by the floating frame 14 and the spine and rib assembly 18 is configured to receive a marine vessel 12 therein. In one embodiment, the receiving area 20 has a height at the longitudinal centerline 22 from the bottom of the spine 24 to the level of the water between about 6 feet and about 12 feet. In other embodiments, the receiving area 20 has a width between the floats 30 of between about 8 feet and about 15 feet. In yet other embodiments, the receiving area 20 has a length from the cross brace 32 to the open end 16 between about 15 feet and about 32 feet. In yet other embodiments, the receiving area 20 has dimensions of about 6 feet in height at the longitudinal centerline 22, about 8 feet wide, and about 28 feet long. In yet other embodiments, the receiving area 20 has a volumetric capacity of between about 720 cubic feet and about 5,760 cubic feet. In yet other embodiments, the receiving area 20 has a volumetric capacity of about 1,344 cubic feet.

In operation, a marine vessel 12 is retained within the receiving area 20 with clearance above the water level of about 24 inches. The towed raft 10 is then towed by a tow craft to transport the vessel 12 to a desired location. At that location, launch of the vessel 12 is achieved by generally simultaneously unwinding the cables 54 of each lifting device 28 using the operative controls 64. In one embodiment, a control panel 82 is provided with each lifting device 28 having at least two controllers 84, one for extending (unwinding or lowering) the cable 54, the other for retracting (winding or lifting) the cable 54. The cables 54 are extended until the vessel 12 is substantially buoyantly supported in the water. The hooks, 56 at the distal ends 58 of the cables, 54 are then disconnected from the vessel 12. In one embodiment, launch may occur while the towed raft 10 is being towed by a tow craft at up to about 2 knots. The vessel 12 then navigates clear of the towed raft 10.

Recovery of the vessel 12 is achieved by positioning the vessel such that the lifting device cables 54 and hooks 56 may be reconnected to the vessel. In one embodiment, a recovery line 86 extending from the tow winch 48 secured to the cross brace 32 is connected to a tow bridle (not shown) at the forward end of the vessel 12. The tow winch 48 is operated to position the vessel 12 generally within the U-shaped floating frame 14 so that the cable hooks 56 may be reconnected to the vessel. The vessel 12 is then lifted out of the water by the lifting devices 28. In one embodiment, recovery may occur while the towed raft 10 is being towed by a tow craft at up to about 2 knots.

One or more crew members (not shown) may man the towed raft 10 for achieving appropriate launch and recovery activities as described above. Crew members generally remain on the substantially flat upper surfaces 36 of the floats 30. Railings 42 are provided for preventing unintentional entry into the receiving area 20 or for holding onto by crew members as the towed raft 10 floats on a body of water.

While specific embodiments of the invention have been shown and described herein for purposes of illustration, the protection offered by any patent which may issue upon this application is not strictly limited to the disclosed embodiments; but rather extends to all structures, steps and arrangements which fall fairly within the scope of the claims which are appended hereto: